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RIA TECHNOLOGIES – WEB-BASED BUSINESS APPLICATIONS DEVELOPMENT

Abstract: The author describes RIA technologies: Flash and Silverlight. These technologies are used in business Internet applications. Modern trends of developing information systems are based on SaaS model (Software-as-a-Service). Growing popularity of Internet applications causes that RIA technologies will be more important in the future.

1. Introduction

With rapid growth of enterprises and ever-expanding range of their activities, including the logistics area, it is becoming increasingly necessary to transfer operations of management support systems online. A Web browser, available from anywhere, offers system accessibility not only to members of an organization but also to its partners, vendors or clients. Development of systems in the direction of their application across the World Wide Web is unavoidable, and the only open issue is to perfect these systems so that their functionalities and user interface options could be comparable to those of the traditional systems. Silverlight is one of the technology options that make such perfection possible. This technology was developed to compete with Flash and to exceed Flash. Based on the promises of its creators, it offers extensive adaptability of its interface to growing requirements. New product entrance on the market of technologies used in RIA will make Web-based systems more attractive and better fitted to the needs of contemporary applications. On the other hand, further growth of such technologies will be necessary to meet growing demand and development of IT systems. These two factors – namely RIA technologies growth and adaptation of corporate structures to new standards, including the need for cooperation and offering online data access and transmission options to clients and partners – should be expected to force system developers to develop products enabling online operation while delivering a similar interface to that of the traditional systems. In her article, the author discusses the technologies applied in RIA based on the examples of Flash, Flex and Silverlight. The goal of the paper is to

present the changes in online applications and point out where the discussed technologies can support such growth.

The Software-as-a-Service (SaaS) model is gaining increasing popularity, and companies more and more frequently decide to use software delivered via a Web browser. This requires software vendors to implement changes leading to their products being offered in such format and to develop existing applications so that they can also be operated online. These trends will occasion changes in applicable technologies, with increasing importance of online application development supporting technologies.

2. Growth of online management support system

Acumen Solutions' research on 100 Fortune-500 corporations 2008 shows that 73 percent of entrepreneurs claim to use or to be planning to use software delivered in the SaaS model during the next 18 months [Muszyński 2008].

Until recently, development of management support IT systems would rather involve extended functionalities [Klonowski 2004]. Now we are witnessing a tendency to move the systems online and to use software as a service. This model is now used not only by small enterprises that cannot afford costly implementation of a system and major investments involved with the purchase. SaaS would frequently occur in technologically advanced public sector organizations, or media corporations (Figure 1).
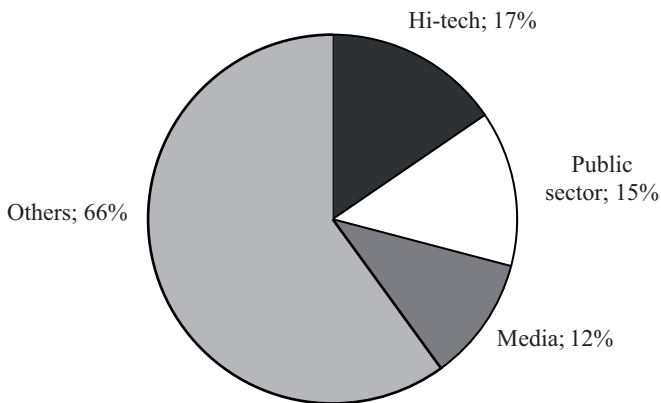

Figure 1. Organizations using SaaS

Source: [Bielewicz 2007a].

CRM systems and HR systems are the current leaders among all systems present on the SaaS market. Interestingly, financial systems tend to occur more and more commonly in this form (Figure 2).
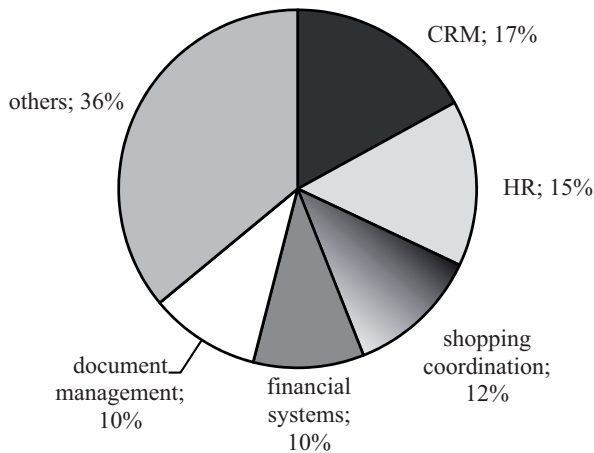
Figure 2. SaaS market shares of particular systems

Source: [Bielewicz 2007a].

Software-as-a-Service systems are not yet as popular in Poland as they are in the US, but the tendency will definitely be increasing. Apart from significantly lower costs of such solutions, these systems have another major advantage – they are much more flexible than the conventional systems.

Currently, online store platforms and accounting systems for small businesses are the points of specific interest. Apart from the system itself, manufacturers would frequently offer expert advice, which is particularly important for the recently flourishing small enterprises, possibly determining not only the choice of system but the very decision to use such a service. Accounting records are often kept by the business owner, who is in great need of such assistance and who truly appreciates guaranteed up-to-date information of any amendments to tax laws and other regulations [Małyszko 2008]. But in fact, switching to this type of service can bring extensive advantages to large corporations as well. The issue tends to arise numerous doubts, which are not always justified. The major risk areas related to SaaS implementation are associated with security [Bielewicz 2007a]. This refers both to technological and business security [*SaaS Data...* 2008].

Fear of losing control over the data is of extreme importance here, followed by data accessibility issues and execution of related services. These fears are not entirely unreasonable. iStore, a very popular online store platform, is a good example with its database access solution. The only possibility except for standard system functions is the export/import to/from database, which is still applicable to selected data only. For more sophisticated systems, lack of direct database access may arise very serious objections. On the other hand, issues related to losing control over data, or rather with data leaks, are to a certain extent exaggerated. Firstly, employees are

the most common source of data leaks, and the problem occurs much less frequently during data transmission [Bielewicz 2007a]. Secondly, contemporary Web browsers offer better transmission security than many client software applications.

Loss of data access control and unauthorized restriction of server access by software providers can happen, and enterprises may protect themselves against such risks through properly construed contracts.

Key advantages of SaaS include [Bielewicz 2007a]: purchasing value rationalization, cost savings in terms of hardware platform operation personnel requirements, scalability and flexibility of solutions.

It is worth noting that software offered as a service is usually updated more frequently than standard systems. Salesforce.com, a renowned SaaS supplier, would release new versions quarterly [Schwartz 2007; Bielewicz 2007b] and, probably more importantly than the frequency itself, its patches and adjustments are largely based on user feedback. Establishing of community websites for users is not a rare occurrence. It holds true for Salesforce as well – it has established AppSpace for communicating with the clients, partners and employees of Salesforce. A discussion board was established for users of the above mentioned Polish iStore platform, where users can share their feedback, on the basis of which the system will then be adapted to their requirements. If a system developer is capable of responding to his customers' feedback, he will consequently be able to deliver a continuously improving product, well fitted to user expectations.

Growth of Web-based systems is unavoidable, as is the growth of technologies enabling development of such systems. RIA technologies are used in production of Web-based applications, supporting development of interfaces and binding them with data [Silverlight 3 2009]. As a result, work with online applications available via a Web browser closely resembles work on a standard system.

3. Technologies applied in RIA development

RIA – Rich Interactive Application – is a term originally used to describe websites featuring Flash technology. These solutions enable work in dynamically generated single-screen interface, without multiple reloading of page when entering data to forms [*Flash Player...* 2009]. This is possible due to exploitation of client machine computation power, leading to elimination of data downloads during an open session. Data would be downloaded at the beginning of the session, and requests to server are transferred when the user transmits data. This contributes to a major improvement of Internet connection usage efficiency and reduced server loads.

The technologies used for developing such applications include: Flash and Flex by Adobe, and Silverlight by Microsoft.

Until recently, Adobe Flash was definitely the exclusive remarkable technology for such solutions. However, Microsoft has recently come up with its own proposal. Both Flash and Silverlight are Web browser add-ons, enabling selective refreshing

of Web components without necessarily reloading the whole page. The first online applications would only use the static text displayed by browser. Computer startup environment was used to enhance and extend website functionality. Java applets or Active X have not, however, become so popular as Flash, which is all-pervasive today. Its extensive popularity derives, among other reasons, from that it strongly improves visual attractiveness of websites due to advanced graphic functions applied in this technology.

Silverlight is a very similar technology, but – considering the enormous popularity of Flash – it will probably not be able to stand competition among end users. Still, it seems to have certain growth perspectives in business solutions. It is certainly distinguished in that it offers unlimited possibility of combining page code with applications working in Windows environment [Silverlight 2 2009]. For instance, a Web-based spreadsheet similar to Google Spreadsheets can be created with an interface developed in MS Excel. The difference between Silverlight (and Flash) and a Java applet or ActiveX is that the former does not require installation of any additional software [Silverlight 3 2009]. COM components and low-level system libraries are not accessed directly. The aspect which has turned out to be an advantage (particularly in terms of popularity as compared to Java or ActiveX) also imposes certain limitations on growth of Web-based systems. If a specific code cannot be installed on user machine permanently, it may hinder the process of building large modular systems [Silverlight 2 2009].

Generally, technologies on the RIA market follow three tendencies in Web-based systems programming:
– code execution on a virtual machine, outside the client environment,
– use of stage graph in graphics definition,
– data binding while creating user interface.

Unlike the former graphics solutions, modern RIA technologies enable interpretation of an image not as a single object but as an array of multiple components (images, videos, subtitles) arranged into a coherent whole. In this way, selected graphic components can be processed and transformed as appropriate [Silverlight 2 2009].

Like other technologies on the RIA market, Silverlight is multimedia-oriented [Lewandowski 2009], but as it supports .NET, it may well be used in business systems. This is due to improvement of visual and functional quality of user interface in management support systems offered online, and in business websites.

4. Use in online business applications

Growth of online business applications is certainly determined by technologies, but there is also a visible trend toward creating such technologies that will meet the increasing requirements of enterprise management. Inconvenience involved in using online applications, such as the need to reload the page during work, has already been eliminated. Contemporary technologies are aimed at enabling development of

such systems that, taking advantage of attractive appearance of online applications or quick and easy remote data access, will offer the same benefits as local systems. AIR – Adobe's response to Silverlight – can be taken as an example here. It allows the user to launch Web applications regardless of whether the desktop is online at the moment.

Still, Silverlight's true competitor on the RIA market is Flex. Before its appearance, programmers using HTML forms would have limited opportunities of business application development. Flex has significantly extended the range of such possibilities by providing missing controls, such as [Silverlight 2 2009]:
– combo drop-down list,
– calendar,
– table with data sorting and editing options,
– control for viewing hierarchical data.

Apart from the new GUI components – which are today considered an absolute standard – Flex has also offered the option of linking interface with data. Java wo-uld offer this possibility as well, but with Flex this no longer requires hundreds of code rows. The problem with declarative data binding has been perfectly resolved. Besides, Flex guarantees that the pages developed in it will display correctly in all popular Web browsers and operating systems, which is very important from the per-spective of potential buyers or Web-based application developers.

Silverlight, like Flex, is designed for development of Web-based applications with a rich user interface. Here, like in the Adobe solution, programmers are offered an extensive choice of options for enriching their applications. However, Adobe de-cided to make Flex a distinct product, separate from Flash, and Microsoft went for a single integrated product.

Silverlight is designed to enable development of RIA applications that would feature downloading of data from one or multiple websites. This databinding module of Silverlight seems to be a bit inadequate. Certain problems occurring in this area severely affect the process of management system development. The first issue is the fixed link between data layer and GUI. The developer is therefore unable to change the user interface model without interfering with the data model. Another issue is the restriction of data binding to a predetermined set of properties by Silverlight authors, disabling free choice of components.

Both Silverlight and Flash are limited by SOP – Same Origin Policy, meaning that they can use the network only for connecting to the server from which they were downloaded. This is an important issue in an online environment, particularly for business application users. It seriously restricts their functional capability but guarantees that the client's machines will not be used for spam distribution or illegal attacks. These limitations can be evaded in a certain way through the possibility of using crossdomain.xml files, controlled by website owners. Moreover, applications created with Silverlight can download additional code from the Internet, specifying its address.

The issue which still remains definitely unresolved is related to development of modular systems, but it will certainly be handled in the near future. Even today, certain new technologies, including AIR, allow for launching Web-based systems regardless of network connection.

Silverlight was created, among other reasons, for the purpose of eliminating differences between Web-based applications and applications launched on the local desktop. AIR by Adobe was developed with a similar goal in mind. A tendency for movement of software to the Internet is becoming more and more remarkable. It is still too early to proclaim that ERP systems are being replaced with online systems, but enterprises are definitely more willing to expand their systems with extra applications, often integrated with ERP. These include:
– online procurement,
– online sales,
– online setup,
– online CRM.

To create attractive Web-based applications for customers, developers must use RIA technologies.

AIR-based solutions are implemented in such sites as eBay, AOL, or NASDAQ [Lewandowski 2009].

NASDAQ offers an advanced graphic interface for tracing stock exchange data in real time. The user can also enlarge and reduce the diagrams, as well as – most interestingly from the website users' perspective – compare current quotations with historical data.

5. Summary

The competition between Adobe's and Microsoft's products on the market of technologies used in online systems leads to the conclusion that online IT management systems will continue to expand rapidly, offering even more new possibilities.

Online business solutions implement advanced technologies. Enterprises would more and more frequently decide to use management systems offered as services [Maciejewski 2008]. Such applications are launched in a Web browsers, and their expansion will be definitely aimed at achieving similar functionality to that of desktop-based systems while maintaining and improving their visual quality or data accessibility outside the office, offered by Web-based systems.

Current developments in the field of RIA lead to the conclusion that if companies are willing to use management support systems as services offered online with consideration of their significantly lower costs, then the same companies will become more attracted to these systems due to their superior visual and functional quality.

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